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Report of the Fifth Session

ADVISORY COMMITTEE ON MARINE RESOURCES RESEARCH

Rome, 8-13 July 1968

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
ROME, 1968

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Rome, September 1968

PREPARATION OF THIS REPORT

This is an edited and approved version of the Report of the Fifth Session of the Advisory Committee on Marine Resources Research (ACMRR: 5/68/W.P.25) as amended at the closing session. The approved versions of the Report of ACMRR Working Party on FAO Regional Fisheries Councils and Commissions as well as the ACMRR/ICES Working Party on the Fishery Resources of the Eastern Central and Southeast Atlantic are being issued as supplements to this main Report

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I. GENERAL REPORT

1. PROCEDURAL MATTERS

1.1 Opening of the Session

The Chairman, Dr. C.E. Lucas, opened the Session and welcomed the members of the Committee, the representatives and observers from UNESCO, WMO, IOC, and SCOR, and other participants. He informed the meeting that unfortunately two members, Dr. Alekseev and Mr. Lee, were unable to attend. He noted with pleasure, however, that the IOC was represented by its Chairman, Admiral W. Langeraar and also by its secretariat, and SCOR by its newly-elected President, Professor W. Wooster, and that Dr. B. Diop, a present member of ACMRR, had recently been elected as Chairman of COFI.

Before introducing Mr. R.I. Jackson, the Assistant Director-General (Fisheries), the Chairman reviewed briefly some of the main activities of ACMRR since its 4th Session, especially in connection with the implementation of the scientific aspects of the UN Resolution 2172 (Resources of the Sea) and pointed out the fruitful collaboration established in this respect with SCOR and WMO(AC).

Mr. Jackson then welcomed all participants, on behalf of both the Director-General - who was absent from Rome - and the Department of Fisheries. He confirmed the keen interest of the Director-General in the work of the Committee and said that the Director-General intended, on his return, to meet its officers for an exchange of views on the results of the Session. Mr. Jackson referred to the close collaboration between FAO and UNESCO/IOC, one indication of which was the recent visit of the Chairman of IOC to Rome for discussions concerning UN Resolution 2172 and the related UN Resolution on the Sea Bed (2340).

Mr. Jackson informed the Committee that the Directors-General of UNESCO and FAO had recently agreed on some concrete measures to develop joint action by the two Agencies in the field of marine sciences and fisheries, including the establishment of a senior post of FAO Marine Science and Fisheries Coordinator whose duties will include liaison with the UNESCO Office of Oceanography, and cooperation with the IOC Secretariat. The agreement marked a new phase in cooperation between the two Agencies. It represented an immediate step in the direction of the proposals of the UN Secretary General concerning Resolution 2172, and was reached in the expectation that IOC and UNESCO will take urgent action to review and initiate the necessary changes in the IOC statutes which would permit it to play the role of focal organization for formulating and coordinating the proposed expanded programme of international cooperation in ocean investigations. A delay at this time in moving towards rationalization of international machinery, which could produce a widespread feeling of frustration, would stimulate search for other alternatives and would constrain FAO to revise its position.

Mr. Jackson expressed his confidence that the friendly work which had been developed in recent years between the UNESCO and FAO Secretariats, and the collaboration with other organizations, would permit attainment of the common objectives that member countries now expected in this field. Finally, Mr. Jackson noted that the ACMRR had been in existence for only five years, but that its activities had already had a great impact on various aspects of FAO activities and on fishery science in general, and compliment the Committee on such important achievements.

1.2 Adoption of the Agenda

In introducing the Agenda, the Chairman pointed out the probable need to establish some drafting groups which would report back to the Committee during the session.

The Provisional Agenda was adopted with the addition of item 6.7 -"Other Matters", and on the understanding that various major items were interrelated and that some flexibility in the sequence of dealing with them would be permitted.

The Committee noted that the volume of documents for the session was substantially reduced as compared with previous meetings. Some members felt, however, that the Committee would work more efficiently if an Annotated Agenda or action paper outlining the main features of each of the main topics could be prepared by the Secretariat and circulated in advance of each Session.

1.3 Date and Place of Sixth Session

Bearing in mind the special relations existing between ACMRR and IOC, it was suggested that the Committee's Sixth Session be held in conjunction with the Sixth Session of the Commission which is scheduled to be held at UNESCO in the fall of 1969. Some members were of the opinion that a meeting in Paris would permit the Committee as a whole to become better acquainted with the Commission's work. It was also suggested that arrangements might be made to facilitate a half day meeting together with the SCOR Executive which is expected to meet in Paris before the IOC session. Some other members, however, considered that it would be preferable to have the ACMRR session in Rome, among other reasons to take full advantage of secretariat facilities.

The Committee recommended that the final date and location for the Sixth Session of ACMRR be decided by the Chairman in consultation with the Secretariat.

1.4 Elections of Officers for the Forthcoming Period of Activities

The Committee considered that at this time of intensive international discussion of international ocean affairs it was essential to maintain continuity in its officers and accordingly re-elected Dr. C.E. Lucas and Dr. W.M. Chapman as its Chairman and one of its Vice-Chairmen (Rapporteur) respectively, for the forthcoming period of activity. Dr. S. Tanaka was elected as the other Vice-Chairman.

The Committee decided that it would also be desirable to form a small steering group of its members to assist in further consideration of the Committee's matters concerning especially the implementation of UN resolution 2172 and relations with the IOC. It appointed to this steering group the Chairman and the two Vice-Chairmen, and also Dr. Bogdanov as one of two members of the Committee who are appointed by the Director-General of FAO on the basis of nominations by the IOC.

2. IMPLEMENTATION OF RECOMMENDATIONS OF THE FOURTH SESSION

2.1 General

The Secretary drew attention to the relevant parts of the Report of the Fourth Session of the Committee and presented a summary report on FAO Activities in Marine Resources Research and Management together with information about actions which had been taken on the Committee's recommendations. The Committee found this report of great interest and recommended that copies of it be circulated together with the Report of the Fifth Session. The Committee would also wish to receive similar reports in future.

The Committee had been requested to comment on the proposal for a scheme for International Cooperation in the Study of Marine Biological Resources, submitted by Prof. V.G. Kort to the session of the joint ACMRR/SCOR/WMO(AC) Working Party on the Implementation of UN Resolution on The Resources of the Sea (Rome, July 1967). This had been issued as an ACMRR Working Paper, and made available to the SCOR General Meeting (La Jolla, June 1968); copies would also be circulated to the IOC and to participants at the ICES/FAO/ICNAF/UNESCO Symposium on Marine Food Chains (Aarhus, Denmark, July 1968).

The Committee approved the action taken by the Secretariat and suggested that further discussion of Prof. Kort's proposal might take place in the context of the comprehensive programme of international cooperation defined in section 5.1(a).

2.2 ACMRR Working Party on FAO Fishery Councils and Commissions

The Convenor of the ACMRR Working Party on FAO Regional Fisheries Councils and Commissions, Dr. G.L. Kesteven, submitted, for consideration and approval by the Committee, the revised version of the report of his group, which incorporated the amendments proposed and suggestions made by the Fourth Session of the Committee.

As recommended by the Committee, the draft report of the Working Party had been made available to COFI and to its Sub-Committee on the Development of International Cooperation in Fisheries. The ideas and principles contained in the report had guided FAO's action in proposing the reorientation of the GFCM; steps were also being taken to strengthen the activities of other FAO regional fishery bodies.

The Committee noted with satisfaction the good use already made of the report, commended its convenor and members for the work accomplished, and decided that the Working Party, having fulfilled its tasks, should now be disbanded.

2.3 ACMRR Working Party on Direct and Speedier Estimation of Fish Abundance

The Secretary introduced the progress report of the Working Party on Direct and Speedier Estimation of Fish Abundance prepared by its Convenor, Mr. B.B. Parrish. Since the last session, work had been concentrated on producing a manual on the use of acoustic methods in fisheries research, which was now in draft form and would soon be published by FAO. Some members of the Working Party were also assisting in the planning of the ICES training course on the use of acoustic methods in fishery research, to be held in Norway in February/March 1969, with the assistance of FAO.

The Working Party had thus completed its task. The Committee expressed its great appreciation for the work done, which had already had an impact on some of FAO's activities, such as the West African Sardinella Surveys. The Committee decided to disband the Working Party but to invite two of its members (Mr. B.B. Parrish and Mr. L.M. Midttum) to continue to act as correspondents for the Committee on developments in this field and to report to the Committee at its next Session.

3. GUIDE LINES FOR THE DEVELOPMENT OF FAO ACTIVITIES

3.1 Scientific Advice to Fishery Management and Development Bodies

The Committee considered the steps it might take, in short and long terms, to promote the use of science in the management and development of international fisheries.

Active steps are being taken towards setting up new bodies with direct management responsibilities, in a number of areas. These areas, and the stocks concerned, include:

(a) The Atlantic tuna (The International Convention for the Conservation of Atlantic Tuna had been signed, but was not yet in force).

(b) The south-east Atlantic fisheries (a draft convention had been prepared, and circulated to interested governments, and a revised draft was being prepared).

(c) The fisheries of the north-western African shelf. (The new FAO Fisheries Committee for the Eastern Central Atlantic would meet early in 1969. The joint ACMRR/ICES working party had shown that certain stocks in this area and in the south-east Atlantic were being heavily fished).

(d) The Indian Ocean fisheries, particularly for tuna (the new FAO Indian Ocean Fisheries Commission would meet for the first time in September 1968).

(e) The south-west Atlantic fisheries (the recent session of COFI had requested FAO to prepare a draft convention).

The emergence of these new international bodies will multiply, problems of the kind with which the Committee is concerned.

The Committee therefore believed it to be a matter of some urgency to establish a code, or set of guide-lines, for the effective development, presentation and use of scientific advice.

The Committee proposed that this matter be dealt with at three levels:

First, identification of problems about which advice might be sought and scientific activity organized.

This level was represented by the question: what advice does an international fishery body need?

Second, conduct of research from the results of which advice might be formulated.

This level is represented by the questions:

(a) how should an international fishery body promote action to get the advice it needs?

(b) how, and in what form, should that advice be presented?

(c) what technical characteristics must such advice have to be acceptable?

Third, presentation and use of such advice.

This level is represented by the question: what might be the obligations of an international fishery body in receiving, approving and acting on advice?

Identification of Problems:

The objective should be to establish effective procedures for identification of matters on which each international body could profitably seek advice, and to ensure that those procedures are comprehensive and reliable, and consistent with the state of technology in the area concerned.

The scientific community must be responsible not only for answering questions but also for framing questions; the scientific process finds new problems as it solves old ones.

Conduct of Research:

The next task would be to establish a set of procedures for:

(a) formulating the terms of reference for research;

(b) setting priorities;

(c) organizing and managing research (funding, coordinating, standardizing);

(d) ensuring that:

(i) all pertinent data are used,

(ii) particular aspects of background research are supported,

(iii) scientific expertize is mobilized, and

(iv) basic data are collected.

(e) mobilizing research groups, and establishing new groups in countries where the need exists;

(f) formulating advice and presenting it to an international body; evaluations and interpretations of data, ensuring their precision, relevance, scope and predictive efficiency.

The Committee noted in this connection that there was considerable overlap in the regional marine science activities of FAO and UNESCO. This presented a problem, particularly for developing countries, scientists being required to attend both FAO and UNESCO meetings where closely related or even identical subjects were considered. The Committee therefore urged that the marine science activities of FAO and UNESCO at the regional level be better coordinated, or even combined. Such joint arrangements could provide for periodic reviews of scientific programmes pertinent to fishery development, and advice on specific questions concerning the new fishery management problems. They could also permit a more effective use of the small total funds available for international marine science affairs.

The Committee decided to consider at its Sixth Session the formation of a Working Party on Scientific Advice to Fishery Management and Development Bodies. This Working Party might be formed towards the end of 1969 or early in 1970. In anticipation of its formation the Committee recommended the appointment of a group of experts to undertake, with the assistance of the Secretariat, the following tasks, from which will be derived the terms of reference of the proposed Working Party:

(a) preparation of case histories, either as to experience at each of the three levels discussed above or dealing with particular institutions (e.g. IWC) at all these levels. These studies should illustrate failures and successes; should examine the relative merits of "research-staffed bodies" (e.g. IATTC) and of "advised bodies" (e.g. NEAFC); and should review the methods by which information is obtained for these bodies, including special arrangements such as FAO task forces.

(b) preparation of an essay on the largely unwritten "guide to action" as it has been operated during the past half-century (e.g. M. Graham's: don't intervene unless you must; ICNAF: base action on scientific guidance).

(c) preparation of a draft "guide" to practice.

The Committee further suggested that the group of specialists should be consulted by FAO through the ACMRR secretariat, when the administrative and other arrangements for the bodies noted above were being made, to ensure that the best provisions for scientific advice are made under the particular conditions in the region.

The Committee finally suggested that the following points be taken into account by the group of specialists (the order of these items has no special significance):

(a) need to promote the use of science to improve fisheries science - in theory, technique and practice;

(b) need for checks and controls;

(c) need for an "ethical code" for marine ecologists concerned with conservation;

(d) need to develop close contact of fisheries research with academic (background) science, especially where UNESCO regional marine science meetings might be associated with the meetings of fishery council.

3.1.1 Research Expenditures

In connection with item 3.2 (see below) the Committee discussed the question of levels of expenditure on marine research, especially that which was directed towards obtaining information as a basis for scientific advice concerning management of the fisheries; its conclusions in this respect are thus more appropriately reported in connection with the discussion on scientific advice generally.

In this regard, the Committee noted that in the report on "International Ocean Affairs" prepared by the Joint ACMRR/SCOR WMO(AC) Working Party on Implementation of UN Resolution 2172, it was pointed out that "the achievement of the proper scientific basis for development and management clearly requires a substantial increase of the scientific effort engaged in research at the national level as well as better international coordination and cooperation. It must also be admitted, however, that even within the present total efforts expended on marine research, improved assessments could be achieved in many fisheries by improving the allocations of these scientific efforts between various fields of study. The basis for an improved allocation could best be given by modern analytical techniques such as systems analysis and linear programming." The Joint Working Party therefore urged "that such studies be arranged, perhaps by ACMRR, on some of the major developed or developing fisheries of the world".

The Committee requested the Secretariat to assemble and initiate analysis of information concerning national and international expenditures on research oriented to marine fishery resource management, especially in relation to the values of catches and also, where possible, to the intensity and costs of exploitation, and to the overall expenditures on marine research, including exploration of fishery resources. Members of the Committee expressed their willingness to submit information concerning their countries and to assist in its interpretation. Even the preliminary results of such a study would be of value to the Joint Working Party proposed under Agenda Item 5.1. The Committee decided to review the problems and the progress in this study at its Sixth Session.

3.2 The Funding of Research Required for Rational Fishery Development and Management

The Committee affirmed that a key problem in fishery development and management on a world-wide basis is the lack of money with which to do the research upon which, and only upon which, rational fishery management decisions can be made. The nations have not been, and are still not, willing to appropriate adequate funds for the research required to husband the common property living resources of the sea in a rational manner. Belonging to all, these resources are harvested by all and, with a relatively few exceptions, husbanded adequately by none. In no nation is fishery research as a whole supported at a level adequate to minimal management needs for all the resources being harvested; it is supported by most nations at such a low level relative to minimal need that fishery management problems as a whole are reaching a crisis level on a world-wide basis.

Adequate funding with which to conduct the biological research by which the effect of the fishery upon the stocks being fished can be evaluated is not provided to national fishery agencies or universities, to bilateral and multilateral intergovernmental fisheries commissions, to international fisheries commissions, councils and committees associated with FAO, or to FAO Department of Fisheries. Environmental ocean and atmospheric research conducted through those agencies also is not funded adequately at levels necessary to permit a proper understanding of the effect of environmental variation on these biological factors. The result is that the very scarce funds available for the biological research must be deployed to environmental research in order to be able to understand the results obtained from the biological research.

Despite repeated blunt warning by the ACMRR, by other groupings of marine scientists, and by individual experts, as to the need for balanced funding for both development and management activities, the great weight of funding in fisheries work is still going towards developmental activities in all parts of the world ocean. The regular programme of FAO Department of Fisheries remains badly underfinanced in relation to the field programme, which is mostly developmental. The consequence is that the field programme

cannot be properly serviced in respect of resource research. In general, UNDP-funded programmes are still inadequate to meet the requirements for the biological and environmental research without which the "rational" use of living marine resources cannot be rational. Bilateral fishery assistance programmes remain heavily slanted towards developmental activities.

Most national fishery budgets are dominantly aimed at developmental problems. Credit agencies still make loans for fishery development with little or no knowledge of what effect the new fishing effort thus generated will have on the respective fish stocks. A consequence is a growing array of serious over-fishing problems in the world ocean, and several that are suspected but for which the research background is so weak that they cannot be defined with adequate precision. To attend to these over-fishing problems, a wide array of international and intergovernmental arrangements have been created and several more are in the process of being created pursuant to the recommendations of the Committee on Fisheries and the desires of the nations involved.

The existing international fisheries commissions and councils, with few exceptions, have not been funded adequately to conduct and coordinate the research required to know how to manage the resources within their purview. The new international fisheries bodies now being set up will be in an even worse condition because, in general, the required research funding is not being provided at the national level, at the international body level, or through FAO.

A major result is a wastage of food production and money, large by any standard, and huge by comparison with the price the adequate management research would cost. Examples are provided by the Pacific sardine, Pacific mackerel, Atlantic menhaden, whales in all parts of the world ocean, North Atlantic cod, Georges Bank haddock, Atlanto-Scandian herring, South African hake, Central Pacific tuna, Atlantic tuna, North Pacific ground fisheries generally, Gulf of Thailand trawl fisheries, North-West African trawl fisheries, American oyster fisheries generally, etc. Some quite large resources in this list have been reduced to levels at which production is no longer economically possible and the fishery has stopped; in other instances that end is clearly approaching.

A second result is evergrowing friction among nations over fisheries jurisdiction. This prevented agreement on the breadth of the territorial sea and related questions at the Law of the Sea Conferences of 1958 and 1960. Fishing pressure has at least doubled since that time, with jurisdictional friction among nations on fishery issues growing at a greater rate than that. These jurisdictional problems cannot be mitigated in the absence of knowledge and understanding of the natural and man-made causes of the specific problem.

The General Assembly of the United Nations has been agitated for the past two years over aspects of the organization of international marine ocean affairs, and it remains so. A substan-

tial factor in this agitation has been over-fishing and resultant friction among nations. No type of organization for world ocean affairs which can deal efficiently with these affairs can be developed unless the research is funded which will permit an accumulation of understanding of the natural and man-made causes of the problems. At the heart of these general ocean jurisdictional and organizational matters are the plethora of fishing problems and the variety of international organizations developed to deal with them, nearly all of which are under-financed from the standpoint of doing the research to solve the problems which they were created to solve.

The nations, industry and the general public are expecting in a vague way that the application of science and technology will solve these over-fishing and jurisdictional problems by some sort of alchemy and perfected organization. The Committee agreed that it must be bluntly stated that fishery science is not presently equipped to deal with the existing array of these problems, much less with those that are being rapidly created by ever-increasing new fishing pressure. It is too anaemic from being too long starved. New scientists educated to deal with such matters have not been, and are still not being, trained in the developed and developing nations as rapidly as the problems are being created by the nations which are creating new fishing effort.

The Committee recommended:

(a) That the Director-General continue to present these facts to member nations by such means as he deems appropriate and effective.

(b) That UNDP and credit agencies make arrangements for an adequate research component in each internationally funded fishery development programme, and particularly that they participate in funding the activities of the international fishery bodies now being newly created.

(c) That the regular programme of FAO Department of Fisheries be brought into better balance with the field programme to the end that these general problems can be dealt with more effectively.

(d) That the integration of FAO fisheries work with IOC environmental and biological research programmes be made as intimate as possible and as soon as that can be arranged.

The urgency of these problems on a world-wide scale is such that the Committee could only predict steadily increasing harmful interaction in international marine affairs unless some further practical steps to mitigate this situation begin to be taken. Among these the Committee instances the following examples:

(a) The International Commission for the Conservation of Atlantic Tuna will probably come into force in 1969. The financial causes of this convention tie the level of contribution to that of the lowest contributing member. Several of the

members involved, especially South American and African countries, have little to contribute to the support of this Commission, neither do most of them have national fishery agencies able to contribute much in terms of research useful to the Commission's objectives.

The need for this Commission has been stated by the countries of West Africa to be urgent for the past seven years; that this need is more urgent now than it was when these countries first asked the Secretary-General of the United Nations to initiate its formation early in 1961.

International means need to be found to support the work of this Commission, at least in its formative years, and its formation will be merely a delusion which gives the appearance of respectability and service towards a desired and necessary goal without in actuality providing much such service.

(b) On the other hand, FAO and the UNDP are to be commended for the steps being planned, through the International Indian Ocean Fishery Development Project in relation to the new Indian Ocean Fisheries Commission, to remedy this generally existing need for accompanying fishery development with research required for management. This will be a most useful experiment in rational fishery development and may provide experience that will be valuable for adoption elsewhere in the world. In this regard it is noted that similar plans are in prospect for the FAO Fisheries Committee for the Eastern Central Atlantic.

(c) In general, nations and funding agencies should be made aware that research for management purposes is a fundamental and indispensable prerequisite to rational fishery development.

To-day it is quite practicable and perhaps even normal for a new fishery to develop fishing effort so rapidly that it is difficult, and sometimes impossible, for the research required to elucidate the effect of fishing effort on the population to be done, and rational management schemes to be devised, in a timely manner. Examples have been provided in recent years by the Peruvian anchovy fishery, the Gulf of Thailand trawl fishery, the Alaskan king crab fishery, the Eastern Bering Sea flounder fishery, the South African hake fishery, and the Norwegian purse seine mackerel fishery. All these grew so quickly that they came to maturity before management guides based on adequate research could be formulated or applied.

Management-required research should be started together with development surveys. It should be pursued actively from the beginning of the fishery. It should be continued as the fishery matures, and monitoring research must be provided to go on as long as the fishery exists, as a cost normal to the fishing operation.

(d) No International agency should fund a fishery development project which does not subscribe to or provide for a suitable research body to be available to do the continuing research required for managing the use of the resource to meet generally accepted rational norms. If the internationally funded project involves the creation of a fisheries institute in a developing country (as several organized by FAO with UNDP support have done) provision should be made for the continuation of the institute at a suitable level of performance after the termination of the project.

This might be provided for by encouraging bilateral links between suitable research institutions in more developed countries with the institutes in the developing countries. In the general field of science and technology hundreds of bilateral links of this nature exist between institutions (often non-governmental) in developed and developing countries. They work well and require little money to initiate and foster. This device could be fostered with benefit by FAO-UNDP-World Bank-Regional Bank- and other internationally funded fishery development projects. The main advantages of such an arrangement would be firstly that the research aspect of the project would not collapse at the end of the internationally generated project; secondly, the bilateral continuation would be useful to both participants on its own merits; thirdly, the assumption of continuation by bilateral means would bring in extra funds from other sources.

(e) An international norm should be developed for the amount of living marine resource research that a nation using the common property resources of the world ocean should contribute to the general welfare in publicly promulgated research results. This should be considered to be a payment due to the joint owners of these common property resources for their use, and a contribution required by all such users to the total world budget for such research. This could be a stated percentage of the dockside value of the annual fish and shellfish catch by flag vessels of that nation, or of the value that its catch contributes to its Gross National Product, or any such measure of value of use that is generally applicable. The contribution could be composed of the research support given by the nation to its national institutions, to intergovernmental fishery bodies, and to international agencies for this purpose. Priorities would need to be established rather clearly through an appropriate specialized body of the United Nations family.

(f) As an immediate and urgent requirement, there needs to be formed an International World Ocean Exploration and Development Fund to be administered by an appropriate specialized body of the United Nations family under criteria suitable for harvesting and managing the use of the common property resources of the world ocean for the general welfare. One function of such a fund should be stipulated to be the funding of research in timely fashion adequate for fishery management needs.

3.3 ACMRR Working Party on Fishery Exploration and Charting

The Secretary recalled ACMRR/4/Rec. 3.2.1 and informed the Committee that due to other priorities of work, this Recomendation had not yet been implemented. However, since the last Session, preparatory discussions had been held with the proposed convenor (Dr. D.L. Alverson, USA) and with other experts.

The Committee confirmed its decision to recommend the establishment of a Working Party, the title of which it changed, however, to Working Party on the Mehtodology of Survey and Charting of Fishery Resources, with the following terms of reference:

(a) To make a study of past and current fishery resource surveys and to report on the strategy and tactics of those surveys, in respect of:

(i) choice of locality to be surveyed;

(ii) choice of time of surveys;

(iii) choice of techniques and equipment;

(iv) design of operational plan;

(v) logistic support;

(vi) the design of data processing programmes;

(vii) results obtained.

(b) To develop a method of evaluation of strategies and techniques and to apply this method to actual instances of fishery surveys.

(c) To propose courses of action (including research) that could lead to improvements in the strategy and/or techniques of fishery surveys, and to promote the adoption of such improvements.

(d) To formulate proposals for commonly agreed methods and for standard systems for reporting and processing the data from such surveys.

(e) To propose ways and means by which results and data of direct use to the fishing industry could best and most quickly be presented and disseminated, paying particular attention to advances in this field being made by national and international organizations.

The Committee recommended that the following experts be invited to serve as members of this Working Party:

Dr. D.L. Alverson, U.S.A. (Convenor)
Dr. N. Andreev, U.S.S.R.
Dr. D.H. Cushing, U.K.
Mr. C. Nedelec, France
Dr. L.M. Dickie, Canada
Dr. T. Matsushita, Japan
Mr. S. Olsen, FAO (Technical Secretary)

The Committee was informed that budgetary provisions had been made for a session of this Working Party to be held in the current biennium, possibly in December 1968.

3.4 ACMRR Working Party on Fish Egg and Larva Survey

The Secretary introduced this item which referred to the Working Party established at the Fourth Session of ACMRR. He informed the members of the consultations which the Secretariat had had with Prof. G. Hempel (Kiel, F.R. of Germany), the proposed Convenor of this group, and with various other specialists .

The Committee considered proposals for some modifications and additions to the terms of reference of this group as formulated at its Fourth Session and agreed they should as amended be as follows:

(a) To assess the potentialities and limitations of egg and larva surveys in comparison with other methods of exploration and stock assessment for: exploring new fish resources; studying life histories of fish; estimating the size of spawning stocks; forecasting year class strength.

(b) To examine the literature for data that could be used for these purposes, especially for estimating the abundance of parent stock.

(c) To advise on the best choice of gears and their appropriate operation for quantitative sampling of various kinds of fish eggs and larvae, drawing upon the conclusions reached by other international working groups engaged in similar problems (SCOR/UNESCO, ICES, etc.) and paying particular attention to high speed and self-recording samplers.

(d) On the basis of (c) above, to select methods, for specific research purposes, to be used for the time being as agreed common methods in international cooperative expeditions and in international and regional fishery surveys, until standard methods can be universally accepted; and to advise on intercalibrations of gears and methods.

(e) To report on the availability of material and data on eggs and larvae already collected but not yet fully utilized for fishery purposes, giving special attention to material collected during large international expeditions such as NORPAC, Norwestlant, IIOE, ICITA and CSK, the Barents Sea young fish surveys, to surveys under UNDP/SF projects, and to reviewing the problems involved in analysing data collected incidentally to other studies.

(f) To advise on appropriate planning of surveys, methods for the speedy study of samples, and analysis and presentation of the results.

(g) To prepare a manual (field guide) for fish egg and larva surveys, bearing in mind the particular needs of experts engaged in surveys undertaken by field projects (especially those funded by UNDP/SF) for which FAO is executing agency.

The Committee recommended that the following experts be invited to serve as members of this Working Party:

Prof. G. Hempel, F.R. of Germany (Convenor)
Dr. B.H. Ahlstrom, U.S.A.
Dr. J.M. Colebrook, U.K.
Dr. T.S. English, U.S.A.
Dr. T.S. Rass, U.S.S.R.
Dr. S. Tanaka, Japan

Close liaison should be maintained by the Working Party with Mr. M.W. Matsumoto (Honolulu), who is Convenor of the Working Party on Methods of Collecting Larvae set up by the FAO Expert Panel for the Facilitation of Tuna Research. Both the IBP-PM Plankton Statistical Project and SCOR should be invited to collaborate. For the time being, Mr. S. Olsen (FAO) would act as Technical Secretary for the Working Party, eventually being replaced by the Biological Oceanographer to be appointed in the Marine Biology and Environment Branch. The group should work, at least initially, by correspondence; a session might be required later. A progress report should be made available before the Sixth Session of the Committee.

3.5 Fishery Resources of the Eastern Central and the Southeast Atlantic - Report of the ACMRR/ICES Working Party and follow-up of the ICES/FAO Canary Islands Symposium

The Secretariat reported on the Symposium and introduced the report of the ACMRR/ICES Working Party on the Fishery Resources of the Eastern Central and the Southeast Atlantic. This would be submitted for further action to the Fishery Committee for the Eastern Central Atlantic, to ICES, and to the governments concerned with the proposals for establishment of a new convention for the conservation of the fishery resources of the Southeast Atlantic.

The Committee commended the close collaboration between FAO and ICES on this matter, accepted with appreciation the report of the Working Party, thanked the Convenor and members for their work, and decided to propose to ICES that this Working Party be held in abeyance for the time being, but with the possibility that it might be reactivitated at a later date, in the light of discussion expected at the first session of the FAO Fisheries Committee for the Eastern Central Atlantic, and of the rate of progress in the formation of an intergovernmental fisheries body for the Southeast Atlantic.

3.6 Fishery Resources of Southwest Atlantic - Proposed Joint ACMRR/CARPAS Working Party

The Secretary drew the attention of the Committee to the suggestion by the Third Session of COFI that a joint working party of experts be established by ACMRR or CARPAS to review the pertinent data and evaluate the state of the fish stocks in the CARPAS statistical area, and to advise on conservation measures required for their rational exploitation, as well as on future research

requirements. In making this review the proposed joint ACMRR/ CARPAS Working Party should keep in mind that the FAO Conference at its Fourteenth Session had accepted in principle a proposal by the Delegation of Argentina to convene a Conference of nations interested in the fisheries of the Southwest Atlantic and the action being taken, accordingly, by the FAO Director-General. The Committee accepted this suggestion and requested the Chairman with the assistance of the Secretariat to consult with CARPAS concerning the establishment and composition of the joint Working Party and arrangements for a session.

4. PROGRAMME OF WORK OF FAO IN THE FIELD OF MARINE RESOURCES DURING 1970/71 AND SUBSEQUENTLY

4.1 General Trends

The Committee emphasized that the continued rapid development of world fisheries and the increasing mobility of fishing fleets were placing growing pressures on the living resources of the sea, which may eventually lead to waste of those resources and of the effort expended in harvesting them. The rate of growth of the harvest of the types of resources presently used could not remain at the present level for very long; it was anticipated that the global situation could become quite serious within the next 10 years. Two principal lines of effort were necessary to prevent crisis and to ensure that the harvest of those kinds of living marine resources useful to man will continue to grow without undue increase in the cost of catching. The first was to assess the condition of resources now being fished, to introduce effective management and to develop other mechanisms to maintain those resources in optimal condition, keeping operational costs at a minimum. This would preserve the present resource base to which must be added the catch from known but underutilized or unutilized resources. The second line of effort was to identify new resources, to learn how to use, locate and catch them economically, and to develop information for use in fishing those resources rationally. Success in both lines of activity would depend upon an adequate fund of scientific information and on adequate mechanisms for regulating the fisheries as requested. The Committee recognized a distinct sense of urgency to do the necessary biological and environmental research.

The work of the Department of Fisheries to date had been proceeding in the right direction, but the Committee was concerned that the level of funding was still inadequate. The original plan to increase operational funds and staff over a six-year period had previously been commended, and the Committee noted with disappointment and concern that it had not been possible to maintain the proposed rate of growth. Such delays could only reduce the chances of success in keeping up with the steady growth of world fisheries and would increase the possibility of crisis in face of a growing world protein gap. In the meantime increased fishing effort had exacerbated the problems which led the Conference in 1965 to approve the strengthening of FAO fisheries activities. The Committee was concerned also with what

could be considered to be a serious imbalance between the field programmes and the regular programmes of the Department. Funding of the field programmes was roughly 10 times as large as the regular programme, and this discrepancy appeared to be growing. The administrative and technical servicing costs of field programmes were not adequately covered by the current allocation, and consequently the growing field activities (which are a dominant part of the total fishery programme) were draining away staff effort from the equally important Regular Programme. Until this imbalance was checked, and a more appropriate ratio established, the programmes of the Department of Fisheries are heading for difficulties from lack of adequate headquarters technical staff support and from failure of the Regular Programme to provide appropriate servicing. The Committee recommended that continued efforts be made to correct this situation as soon as possible.

On the favourable side the Committee had been impressed with recent trends in Departmental activities coming under the Committee's purview. The staff included some of the most competent fishery scientists in the world, and arrangements for obtaining expert advice were excellent. Some examples of recent developments of extreme importance to the objectives of FAO, and which should be continued, were:

(a) The World Appraisal of Fishery Resources (including the Indicative World Plan in its resource aspects).

(b) Close collaboration with other international bodies such as UNESCO, IOC, WMO and intergovernmental Fishery Commissions and Councils.

(c) Establishment and support of new intergovernmental fishery bodies in regions where these were needed.

(d) Particular fishery stock assessments, such as the assessment of Antarctic whale stocks, which work had been instrumental in preventing total collapse of the International Whaling Commission.

(e) A developing awareness of marine pollution and its effects on fishery resources and fishing.

(f) Expert conferences on important fishery resources, such as the World Scientific Conference on the Biology and Culture of Shrimps and Prawns, and the recent conferences on research vessels and on fish behaviour in relation to fishing techniques.

(g) Increased interest in environmental research, exemplified by the recent decision to assign a senior staff member to work with the Secretariat of the Intergovernmental Oceanographic Commission, and by collaboration with WMO on the World Weather Watch.

(h) Promotion and application of methods of direct and speedier estimation of fish abundance, especially by sonic techniques.

The Committee recommended that such activities be funded and staffed adequately.

4.2 Education and Training of Fishery Scientists

The Committee took note of the increasing concern for education and training in the field of marine science, including marine resources research, as indicated, for example, by para. 3(b) of Resolution 2172 of the UN General Assembly, and by the steps being taken through the organizations concerned: IOC Resolution V-22, the proposals of the UN Secretary-General as set out in paras. 283 to 285 of his report, and the report of the Third Session of COFI, paras. 82 and 83.

The above documents, and the proposals which are emerging, are concerned with many fields of training, ranging widely from post-graduate education of research workers, and their specialized training in advanced techniques, to the training of fishermen. The Committee noted that the terms of reference and participation in the COFI Sub-Committee on Education and Training were such that it would be concerned largely with problems of the latter kind and with the training of extension workers, general fishery officers, etc., whereas the concern of the ACMRR was essentially with the education and training of scientists and also of technicians participating in the marine science programmes. The Committee considered these matters should be treated separately with respect to the international actions required to improve the general supply and level of trained men concerned with fishery research development and management, and recommended that FAO Department of Fisheries should take due account of this need in its arrangements for expanding work in this important field.

From that starting point the present report is concerned essentially with the special problems of training scientists and scientific technicians. Education and training of fishery scientists may be considered in three stages:

(i) graduate education in fundamental disciplines: especially biology, mathematics, physics and chemistry;

(ii) post-graduate education in marine science subjects generally and in specific fields, such as physical oceanography, marine biology, etc;

(iii) post-graduate training in fishery research, both broadly and in specific subjects and particular techniques, bearing in mind its mission-oriented nature.

Stage (i) is not of concern to the Committee and to those whose responsibility is the promotion of fishery research and development, except in so far as it is necessary for there to be an adequate supply of well-trained science graduates and that steps are taken to encourage sufficient numbers of these to

interest themselves in marine problems generally, and in fishery resource problems in particular. To this latter end, the Department of Fisheries can usefully continue its present attempts to generate interest by the preparation of leaflets on career possibilities, and contributing to general publications in scientific journals, lectures to students and faculty, and in other ways.

The Committee emphasized that at all stages of training there was a need for strengthening national programmes. At the international level the Committee realized that securing an adequate influx of well-educated science graduates who might become interested in marine science, especially in the developing countries, was a main responsibility of UNESCO and also that bilateral arrangements between education institutions were of very great importance.

Education and training in general marine science (stage (ii)) is of direct concern to FAO Department of Fisheries as well as to the UNESCO Office of Oceanography and IOC. The Committee welcomed the proposals set out in IOC Recommendation V-22, endorsed the terms of reference of the IOC Working Group on Training and Education in Oceanography and recommended that the invitation to ACMRR to be represented at the forthcoming session of the Working Group should be accepted. The Committee also recommended that arrangements be made for three of its members, as well as the appropriate members of the Secretariat, to participate in the IOC Working Group. It further recommended that provision be made for the three ACMRR representatives to meet together with the designated Secretariat members for one or two days prior to the meeting of the IOC Working Group to coordinate their views, and subsequently, by correspondence, to prepare advice for the ACMRR and the Department of Fisheries with respect to such problems of education and training of marine scientists and technicians as may arise prior to the Sixth Session of the Committee. The Committee designated the following three members as its proposed representatives to the IOC Working Group and continuing as a consultation group: Prof. J.T. Rudd, Prof. M. Fontaine, and Dr. S. Tanaka.

Fishery research may involve aspects of all disciplines within aquatic science and it is possible that all of these may not be considered by the IOC Working Group. No specific proposals were made by the Committee at this time to ensure eventual consideration of the whole range of problems but further consideration would need to be given to this question by the ACMRR group of three members and by the Committee itself at its Sixth Session in the light of the results of the IOC Working Group.

The Committee noted the kinds of activity for which international assistance might be strengthened as set out in para. 284 of the Secretary-General's Report on General Assembly Resolution 2172: award of study grants and fellowships, conduct of training courses, and assistance to countries in the development of national and regional education arrangements, including the endowment of teaching posts. It emphasized the need to maintain the highest possible standards both in the training provided and in the

qualifications of entrants to special educational and training activities. Students admitted to post-graduate studies in aquatic sciences must already have attained acceptable academic standards in the fundamental disciplines, and this is particularly important to ensure when they are undertaking their post-graduate studies in countries other than their home country or the country in which they began their scientific education. The need for adequate command of language for students studying abroad was also stressed.

The Committee recognized that an essential part of fisheries training was work at sea on fully equipped vessels. Many countries, especially developing countries, lack such facilities, and the Committee therefore noted with satisfaction the arrangements under UNDP(TA) made with U.S.S.R. for training on board a modern research vessel, and the negotiations with Japan, U.S.A. and other countries to secure the same ends. Countries should be encouraged to facilitate such sea-going training, and UNDP should be requested to continue to increase its support of these projects.

The Committee noted that the FAO programme of training through fellowships was almost entirely financed through UNDP funds. It believed that this programme could be greatly assisted through the greater flexibility possible if more funds could be available through the Regular Programme, as is done by UNESCO. It is particularly important that funds be available for use in grasping training opportunities that arise through the conduct of national and international marine research programmes, e.g. so as to make it possible at rather short notice and with the minimum of procedural complications to arrange participation of fellows in research cruises by vessels of other countries.

The effective use of funds for fellowships, etc., depends very greatly on careful selection of students and on the training institution or research laboratory appropriate to his particular field of qualifications and study. In the Committee's view participation of the Secretariat in this choice, making full use of the information possessed by the Department concerning training institutions and facilities, educational conditions and arrangements, as well as fishery research problems in the candidate's country, is highly desirable. The present situation would be greatly improved with respect to the marine science fellowships, seminar, and training centre programme of FAO if the Fishery Resources and Exploitation Division could be strengthened by the appointment of a staff member to deal specifically with this and related problems.

Training in fishery science (stage (iii)) presents special problems, including the need to understand the relevant aspects of fishery operations. Few institutions can offer formal instruction and, generally, such special training can most efficiently be done "on the job" at the institutions - which are limited in number - conducting fishery research at high level. The Committee considered that direct bilateral (inter-laboratory) arrangements should therefore be encouraged. It is also appropriate to conduct special short training courses, as FAO has been

doing in, for example, the field of fish stock assessment, at such institutions, making use of their facilities and the availability of staff, laboratories, equipment, etc. Some of these institutions, especially governmental research laboratories which have no statutory responsibilities for training but which, nevertheless, are responding as far as possible to the demands for assistance in the conduct of training courses and accepting fellowships, could be helped by the provision of some international funds to contribute to costs of extra equipment, laboratory accommodation, and so on. The specialized training that could be arranged at such institutions should, where possible, result in the award of a proper diploma; this can contribute to the attraction of suitable candidates to take such courses and help in maintaining their status on their return home. There is also a national responsibility to ensure adequate support for returning scientists.

Fishery research and marine science generally are advancing very rapidly. The provision of regular refresher courses, perhaps of one to two months duration, is therefore most desirable to assist senior scientists, especially from developing countries, to maintain contact with latest research techniques and theoretical developments. The Committee recommended that the FAO Department of Fisheries explore with the Office of Oceanography of UNESCO the possibilities of securing international funds to contribute to this end.

In the light of the above considerations, the Committee recommended that FAO and UNESCO develop a joint programme for marine science education, particularly directed to securing improvements in international action with respect to stage (ii) as defined above. Thus the programme should also provide for continued and expanded cooperation at stage (iii), having in mind the useful participation by UNESCO in some FAO fishery science training centres and by FAO in some UNESCO training centres which have been arranged in recent years. In developing this programme the Committee considered it desirable that WMO be consulted, not only with respect to training in the subject-matter of marine science, but in order to take due account of WMO's own experience in the education and training arrangements for meteorologists which include activities of a kind different from those which have, in the past, been undertaken by FAO. In formulating a joint UNESCO/FAO Programme, attention might be given to the means of facilitating a full and rapid exchange of information between the two agencies, the possibilities of creating a pool of teaching equipment and materials for use in training centres, etc., the possibilities of jointly developing the work at present carried out separately in the production of manuals for teaching and standardization purposes, and the possibilities of creating an operation pool of funds for these and other purposes related to education and training.

The Committee commended the success recently achieved in pooling funds (including funds in trust), facilities and staff from several sources to make possible the conduct of special training courses, such as the marine and fishery science training course recently held in Tunisia, and which involved contribution of

various kinds by FAO, and GFCM, UNESCO, Mediterranean Marine Science Sorting Centre (MMSC, sponsored by the Smithsonian Institution), Mediterranean Association for Marine Biology and Oceanography (MAMBO), Swedish International Development Authority (SIDA), and the Tunisian National Scientific and Technical Institute for Oceanography and Fisheries (INSTOP).

The Committee did not have time to consider the problem of training marine laboratory technicians, which should be taken up again as soon as possible. It considered the provision of adequately trained technicians can be a decisive factor in the successful implementation and development of marine science in a country, and such technicians frequently carry a very heavy responsibility of continuing and maintaining standards of routine data collection and preliminary data evaluation. Furthermore, notwithstanding the general lines of advice in the above paragraphs, the Committee considered that education and training arrangements should be such that it was always possible for selected technicians to undertake the more advanced training and education required for the formation of research workers.

In developing future cooperative marine science training projects, the Committee believed that consideration should be given not only to concerted action by international agencies but also to the possibilities of joint action by, on the one hand, international agencies and, on the other, bilateral technical aid organizations and bilateral and international arrangements at non-governmental level.

The Committee requested three ACMRR members nominated above to begin, with the assistance of the Secretariat, assessments for both stages (ii) and (iii) of:

- the needs for scientists and scientific technicians during the coming years, taking into account the proposals for the Expanded Programme of International Cooperation (EPIC), and

- the present opportunities for fellowships, etc., which are not now being grasped through inadequacy of funds.

These assessments, and especially estimates of the need for international funds, would assist greatly in appraising the possible utilization of national and bilateral support, as well as the needs for international funds in the future.

In undertaking this task, the group might review the use of present funds for a variety of education and training purposes, attempt to assess whether this is the optimum use and indicate the type of new activities that might be undertaken if greater funds become available and what reallocation among existing types of activities might be recommended.

4.3 Marine Pollution

The Committee noted the satisfaction of COFI with the recent proposal to establish a joint group of experts on marine pollution, to be sponsored initially by FAO, IMCO, and UNESCO, and

in which WMO had recently expressed interest. It agreed that this would simplify and strengthen international arrangements for dealing with this growing problem. It affirmed that more research on marine pollution was needed, especially to assess the rates of biological and mechanical purification of polluted waters in the aquatic environment, to trace the paths of pollutants through the marine biosphere, to assess the cumulative effects of pollution upon marine sediments and benthos, to determine the ecological effects of pollution, and to assess the effects on marine life of the various methods used to deal with accidental pollution.

The Committee decided to take no further action with respect to its own Working Party which it had established at its Fourth Session but to which members had not been appointed. It recommended that the list of potential members to be nominated by FAO to the joint group should be reviewed carefully to be sure that all available expertise was included. The Committee further recommended that the proposed FAO Conference on Marine Pollution and its Effect on Fishery Resources and Fishing Operations should continue to receive high priority, but considered that its postponement from 1969 - as now provided - until 1970 would, if this became necessary, not have serious consequences.

4.4 Improvement of Marine Resources and Mariculture

The Committee recognized the advantages of mariculture for certain high-priced varieties of fish and shellfish but did not believe that there was much immediate promise of mass production of low-priced species. Artificial culture through early stages holds promise for augmenting production or for damping fluctuations in abundance of some resources. For some species techniques are known but for various reasons are not widely practised. Wide interest is developing in fish and shellfish culture, and some important problems remain to be solved. The Committee recommended that the Department continue to keep itself informed on new developments in mariculture and related research so as to take advantage of these as appropriate.

4.5 FAO World Scientific and Technical Conferences

4.5.1 Follow-up of the FAO World Scientific Conference on the Biology and Culture of Shrimps and Prawns.

The Committee reviewed the report and recommendations of this Conference and endorsed the steps taken by FAO to continue in existence, for the time being, and on an informal basis as consultative groups, two working groups resulting from the Conference until completion of the tasks assigned to them:

(a) Ad hoc working group on the Taxonomy and Identification of Larvae and Early Postlarvae of Shrimps and Prawns, with Dr. S. Dobkin as the Convenor and having four other specialists in this field as members, and

(b) Ad hoc working group on the List of Species of Shrimps and Prawns of Economic Value, with Dr. L.B. Holthuis as the Convenor and with six other members.

The Committee noted that coordination of research to facilitate collection and compilation of data, standardization and intercalibration of methods and equipment, and exchange of information and experts between laboratories could be arranged by correspondence. In addition, whenever necessary, relevant problems would be referred to the panel of Shrimp and Prawn experts formed in relation to the IWP which will continue until it has fulfilled its tasks.

4.5.2 Follow-up of the FAO Conference on Fish Behaviour in Relation to Fishing Techniques and Tactics.

The Report and recommendations of this FAO Conference were reviewed:

(a) The Committee recognized the need to measure behavioral and physiological responses in the natural environment, endorsed the relevant recommendation made by the Conference and decided to recommend the establishment of an ACMRR Working Party of 4 to 6 experts to review present experience and knowledge concerning underwater laboratories and submersibles as applying to this field of research. IOC/UNESCO would be invited to contribute to this Working Party.

(b) The Committee also endorsed the recommendation that a small workshop be organized by FAO on board a research vessel to carry out comparative studies on research methods for the study of schooling behaviour as well as to clarify scientific terminology and concepts in behaviour studies. The Committee agreed to assist FAO in planning the workshop and suggested that SCOR be invited to collaborate in organizing it.

(c) The Committee further recommended the establishment of a small group, including the Convenor of the Working Party and the organizer of the proposed workshop, to prepare a draft of a manual on theories and techniques in fish behaviour studies. This work could be carried out by correspondence and the panel might be assisted in this task by an FAO consultant.

(d) The Committee authorized the Chairman, in consultation with the Secretariat, to nominate members of the Working Party and the Panel of experts, and to establish suitable terms of reference for their work.

4.5.3 Future Conferences

The question was raised whether further consideration had been given to organizing World Scientific Conferences on Hakes and Anchovies. The Committee was informed that no

no decision had yet been taken as to which group of species would have priority, but inclusion of one conference of this kind was envisaged in the Programme of Work and Budget for the 1970/71 biennium.

The Committee repeated the request made at its Third Session for an overall review of the policy regarding such species conferences. Drs. G.L. Kesteven and W. Ricker were asked to continue their studies on this matter in consultation with the Secretary, and the members of the Committee were invited to supply pertinent information.

The Committee emphasized the importance of including in the programmes of such conferences the environmental aspects of studies of these resources and their exploitation, and in particular the influence of upwelling on their production and availability.

4.6 World Appraisal of Fishery Resources - Fishery Section of the Indicative World Plan (IWP). including Studies of the Implications for Management

(a) The Committee reviewed and commended the progress made in assessment of the fishery resources of the sea by the Department of Fisheries, as outlined in the summary prepared by the Secretariat. The Committee noted that while this work was pursued as a part of FAO's Indicative World Plan (IWP), it represented an activity that had been of prime interest to FAO fishery staff and to ACMRR for many years. Consequently the Committee urged that this project continue to have the highest priority within the Department, regardless of any change in the status or emphasis accorded to the IWP activities of FAO as a whole.

(b) The present area reviews should be completed and published as quickly as possible. For this purpose it would be necessary to have the services of four or five consultants to review drafts concerning some of the areas, and the Committee recommended that provision be made for this.

(c) The Committee recommended that the results of this work be published as quickly as possible, and in the three FAO languages. They should be included in the appropriate FAO series.

(d) The work done to date confirmed that resource evaluation should be a continuing operation. Better estimates could be made as better catch statistics became available, and as the nature of the response of each stock of fishing pressure became apparent. Hence the Committee recommended that provision be made for more or less continuous revision and up-dating of the assessments throughout the years ahead. Such evaluations would be very useful both to the Department of Fisheries' Regular Programme and its field programme. These revisions could be issued from time to time as supplements to the original publication or in other ways, and the whole work should be thoroughly reviewed at intervals of about ten years.

(e) The Committee recommended that, in completing the present drafts and making revisions, the fullest use be made of studies of the ecological framework of marine production, including the efficiency and rate of primary production, food networks and ecological efficiency, recycling of energy via bacterial populations, predator-prey relations reciprocal replacement of species of similar ecological habits, and estimation of the absolute size of important stocks. Better information on these matters, plus better statistics of annual catches (including discards, unclassified sport and subsistence catches), were needed to make resource estimates more accurate and more useful.

(f) Considering the imminent completion of the present phase of stock assessment, the Committee took note of the fact that it had not yet given due attention to the resource research aspects of the Department's field programmes. It therefore proposed to review these at its Sixth Session, and requested the Secretariat to prepare appropriate background information. This might include:

(i) a summary of the scientific content of present field projects and available research facilities;

(ii) an illustrative account of the development of scientific work in a selected group of projects.

In making its overall review the Committee would take into account the results of the IWP marine resources studies, especially insofar as these revealed gaps in knowledge and inadequate basic information (e.g. the magnitude of the catches and their species and size composition). This review should cover the studies of underutilized resources and also studies of intensively fished stocks in areas in which developing countries are interested.

The Committee considered it desirable that it have pertinent information also about relevant field projects of UNESCO and WMO for its review of the FAO programme.

5. INTERNATIONAL COORDINATION AND COOPERATION

5.1 Implementation of UN Resolution 2172 (Resources of the Sea) and Related Matters

(a) The Committee considered the report and proposals of the Secretary-General of the United Nations regarding an expanded programme of international cooperation to assist in a better understanding of the marine environment through science, "EPIC" (contained in UN document E/4437) and the United States initiative for an International Decade of Ocean Exploration (as set out in a report by the National Council on Marine Resources and Engineering Development of May 1966). The relationship between the concepts was examined and the Committee came to the conclusion that the International Decade could forma vital initial stage of EPIC as well as make a substantial contribution to other activities

contemplated in the Secretary-General's report. The Committee considered it essential that this relationship be understood in order to ensure that the two concepts achieved their common purposes, and to avoid confusion and conflict.

The Committee gave similar consideration, in relation to EPIC, to the Marine Productivity (PM) programme under the IBP of ICSU. It noted that under present arrangements the IBP ends about 1972 and therefore that during the next few years consideration will be given to the question of continuation of activities started under it. The Committee was informed that most, if not all, of the projects now planned, or being implemented, in the national PM programmes for the IBP could be considered as within the scope of EPIC however that might eventually be defined. It therefore would seem appropriate to take account of the PM programmes in the initial formulation of EPIC and to consider the selective continuation of these in the 1970's as an integral part of the first phase of implementation of EPIC.

The Committee noted that in Recommendation 8.18, the Eighth Session of the Bureau and Consultative Council of IOC had invited SCOR, ACMRR and other interested scientific bodies to give early consideration to the scientific content of EPIC and of the Decade. SCOR at its Ninth General Meeting had proposed that the Joint ACMRR/SCOR/WMO(AC) Working Group on the implementation of the United Nations Resolution on the Resources of the Sea be convened in the spring of 1969 to consider these matters. The Committee further noted that the Secretary-General of UN had proposed that work started by the Joint Working Party in the identification of specific scientific problems which require expanded international cooperation be continued.

The Committee was informed that the Director-General of FAO, in line with the views expressed by the Committee on Fisheries, was preparing for participation by FAO in EPIC and in the broadening of the IOC, and that he would welcome the views of the Committee on the scientific aspects of preparing and implementing such an expanded programme.

(b) The Committee therefore decided that a joint working party similar to the Joint ACMRR/SCOR/WMO(AC) Working Group on the implementation of the UN Resolution on the Resources of the Sea would be an appropriate body for the task contemplated by the UN Secretary-General, IOC and the Director-General of FAO, but that the membership and terms of reference of the original Joint Group would require modifications. Membership should cover the various disciplines that may be involved in an expanded programme; approximately fifteen members should be selected from the fields of marine geology and geophysics, chemistry, physical oceanography and meteorology, and biology and fishery science in proportions approximately of 4:2:4:5.

The Committee accordingly recommended that, for the purpose of assisting in the preparatory actions now going forward, a Joint Working Party on the Scientific Aspects of International Ocean Affairs be established. Its members and officers should be nominated in consultation among the officers of ACMRR, SCOR and the appropriate scientific advisory body of WMO and designated in accordance with their respective statutes. The Joint Working Party should meet in the spring of 1969 for about 10 days, preferably at a place favouring undisturbed work, and submit its report promptly to the appropriate officers of the nominating bodies who would have the responsibility for its timely transmission, with comments as may be appropriate, to the IOC and to the Executive Heads of FAO, UNESCO and WMO. The presiding officers of the nominating bodies and representatives of the above agencies should participate in the work of the Joint Working Party, and its Secretariat should be provided by arrangement between the several entities concerned.

Noting that the scope of the Secretary-General's proposals for EPIC had not been precisely defined, the Committee recommended that the terms of reference of the Joint Working Party should be as follows:

(i) To develop the scientific content of a comprehensive programme of international cooperation in exploration and research in the ocean and its resources, taking into account the survey and proposals of the UN Secretary-General in connection with UN Resolution 2172, and also the report on International Ocean Affairs, the existing national and international programmes of cooperation in ocean exploration and research, and other relevant programmes and reports.

(ii) To comment on the practical problems of implementing such a programme, including priorities and timing, taking into account the likely funds, facilities and personnel required.

The comprehensive programme referred to in the above terms of reference encompasses "marine environment" as in the American usage of this term. It would therefore include, as far as fishery matters were concerned, oceanographic research of relevance to fishery research and development, and also such scientific activities as the identification, measurement and assessment of fish stocks, international aspects of the study of marine animal behaviour, marine ecology and zoogeography in relation to the rational exploitation and improvement of the living aquatic resources. For proper formulation of such a programme, studies of the kind being undertaken in relation to the marine fishery resource aspects of the IWP had an essential role, and the programme should envisage arrangements for a continuing review and updating of IWP-type studies to help in the identification of gaps in knowledge, and recognition of new lines of investigation calling for international coordination and support. A comprehensive programme would thus include the concept of the International Decade of Ocean Exploration

insofar as it had yet been defined, important elements of IGOSS and of WWW, and certain research activities of the PM Section of the IBP, as well as the World Appraisal of Marine Resources Research as proposed earlier by the ACMRR and the continuation of more fishery resource data appraisal begun in connection with the IWP.

(c) The Committee recognized that the arrangements for formulation and coordination of such a wide programme of research, covering both the ocean itself and its resources as defined above, would depend upon the eventual determination of the scope of EPIC, and the kinds of activities to be included in it, and consequently on the progress of actions for the broadening of the IOC proposed by the Secretary-General of UN as a matter of urgency.

The Committee agreed that an appropriate modification of the IOC statutes for this purpose, as suggested by the Secretary-General, would be necessary to enable the IOC to serve, by the implementation of EPIC and in other ways, the needs of member states and of the organizations of the United Nations family concerned with promotion and application of marine science. The urgency of this matter had become even greater because of the initiative for an International Decade of Ocean Exploration for which the broadened IOC could provide a suitable international planning and coordination mechanism.

Because the Committee was convinced of the urgency of this matter it welcomed the preparatory actions undertaken by the Bureau and Consultative Council of IOC at its Eighth Session and particularly the Bureau's decision (Recommendation 8.4) on inviting a group of consultants including representatives from ACMRR to consider the future workload of the Commission, its subsidiary bodies and its Secretariat, to formulate requirements in this connection and to make proposals in regard to organizational, administrative and financial matters in this context. The Committee recommended that it should be represented on this occasion by its Chairman or his nominee and by its Secretary.

The Committee noted that the International Decade proposal included "the development of improved oceanwide data collection, processing and services" as one of the basic categories of projects that might be undertaken. In the Committee's opinion this category could be taken to include, in addition to relevant programmes of the WWW, important elements of IGOSS, the progress in the planning of which, in accordance with the decisions reached at the Fifth Session of the IOC, was welcomed by the Committee. The Committee emphasized the key importance of IGOSS for fishery research and development, expressed its readiness to assist in the planning of IGOSS, and recommended this initiative of IOC as one in which FAO should take a very active interest. The Committee considered that the implementation of IGOSS would form a valuable part of EPIC. It therefore hoped that suitable arrangements would be made to ensure adequate financial support for IGOSS.

(d) The Committee, considering the vital importance of effective collaboration between FAO and UNESCO/IOC in the field of marine science and fisheries, appreciating the approaches made to this by the Directors-General of FAO and UNESCO, and by the Chairman of IOC, expressed its satisfaction with the joint action by UNESCO and FAO, as set forth in the Aide-Memoire on Joint Action by UNESCO and FAO in the Field of Marine Science and Fisheries of 3 May 1968, and welcomed the steps taken by the Director-General of FAO to implement the Aide-Memoire which provided for early exchange of draft programmes and budgets, consultation on planning of IOC activities, the outposting of a senior FAO officer to Paris, UNESCO assistance to FAO activities in documentation and related services and other cooperative arrangements. These measures were designed particularly to contribute towards the strengthening and broadening of the IOC and were subject to review, depending on the progress made in that direction.

The Committee recommended that in the further strengthening of the ties between FAO and UNESCO in this field, closer coordination of the regional activities of the two organizations in marine science should be attained, preferably, as in those of IOC, on the basis of ocean areas.

(e) The Committee was informed of decisions taken by the Executive Committee of WMO at its recent Twentieth Session with regard to the strengthening of the marine component of that Organization and its cooperation with other international Organizations in the field of marine science and its application. An important decision was the establishment of a WMO Executive Committee Panel on Meteorological Aspects of Ocean Affairs, composed of Members who are active in marine matters. Ten member states were invited to designate experts to serve on this Panel; the President of the WMO Commission for Maritime Meteorology had been designated by the Executive Committee as an ex-officio expert of the Panel. The Panel will act as the focal point for all WMO activities relating to meteorological aspects of ocean affairs and, amongst other things, it should effect the closest collaboration with the Working Committee of the IOC on IGOSS to ensure that there is consistency in the planning and implementation of the IGOSS on one hand and of the World Weather Watch on the other. The WMO Executive Committee had also decided that WMO participation through designation of experts in joint working groups of expert advisory bodies (such as the Joint ACMRR/SCOR/WMO(AC) Working Group on Scientific Aspects of Implementation of UN Resolution 2172) should be strengthened. Negotiations will be opened with the Director-General of UNESCO regarding the designation of a WMO liaison officer with UNESCO to collaborate with the Secretary of IOC on scientific and technical aspects of oceanographic projects involving meteorology. The WMO Executive Committee had proposed that the liaison officer remain stationed in WMO Headquarters on the understanding that, when specific projects so required, he would be available to work for short periods of time at the UNESCO Headquarters.

In the view of the Committee all these actions by WMO are to be welcomed as furthering that development of cooperation and coordination in the field of ocean research which is so essential to securing an improved and sustained yield from ocean resources for the benefit of mankind.

5.2 Matters raised by SCOR

The President of SCOR summarized the proceedings and relevant recommendations of the recent SCOR meeting in La Jolla, from which it appeared that SCOR activities relevant to the work of ACMRR would increase in future and that the recent close collaboration with both ACMRR and IOC would be further developed.

5.2.1 SCOR/ACMRR Working Group on Continuous Monitoring in Biological Oceanography

The President of SCOR informed the Committee that SCOR, recognizing that variability in biological systems had considerable scientific and practical importance and that there existed opportunities to include biological measuments in observational systems designed primarily to monitor physical changes in the ocean, had decided to establish a Working Group on Continuous Monitoring in Biological Oceanography. He invited the Committee to co-sponsor the Working Group and to designate experts to it. In view of the importance for fishery research of the matters to be considered by the Group, the Committee recommended acceptance of the invitation and authorized the Chairman, in consultation with the Secretariat, to nominate its member or members to what would henceforth be a joint SCOR/ACMRR Working Group, with the following terms of reference:

"To review critically the present status of devices for:

(a) continuous observation of perameters such as pigments, particles, transparency, submarine irradiance, primary production, nutrients, and

(b) continuous or intermittent sampling of organisms, and to list suitable techniques and instruments for such measurements."

5.2.2 Influence of ocean variability on fish stocks

In considering the questions of ocean variability, the Committee noted the particular importance of changes of periods in the range of several years to several decades. Phenomena such as El Niño and associated changes in the trade wind system were in this portion of the variability spectrum. Changes of such frequency have an important influence on the distribution, availability and abundance of fish stocks and must be studied in order to improve fishery forecasts. This was particularly true in the development of rational use of living resources of the

tropical and sub-tropical ocean, but was also of consequence in higher latitudes.

The Committee also noted that WMO was conducting several large projects by which data suitable for these studies would become available. It considered the possible creation of a Working Party to study what more could be done to encourage adequate attention by meteorologists, physical oceanographers and fishery scientists to this portion of the variability spectrum. However, in view of the existence of an IOC Group of Experts on Oceanic Variability, and of a Programme Committee for the ICES Symposium on Physical Variability in the North Atlantic, it was decided first to invite these bodies to give particular attention to ocean changes of periods from several years to several decades. If that did not, in the Committee's opinion, stimulate sufficient attention to this matter, the Committee would return to the consideration of other appropriate means to stimulate such activity at its next session.

5.2.3 Oceanographic research on the Continental Shelf

The President of SCOR reported that SCOR was very concerned with the fact that some governments were interpreting the UN Convention on the Continental Shelf, which had now been ratified by many maritime nations, in such a way as to hinder scientific investigation of the circulation of ocean waters, the biology of the sea floor, and other problems of considerable scientific importance. SCOR had decided to ask its members, national committees and their parent organizations to urge Governments to adopt liberal interpretations of this Convention in order to facilitate the conduct of oceanographic research. It invited ACMRR to associate itself with such action. The Committee understood that the IOC Working Group on Legal Questions related to Scientific Investigations of the Ocean would be considering aspects of this question.

The Committee shared the concern expressed by SCOR, and decided to bring this matter to the attention of the Director-General of FAO and request that he take appropriate steps to make member countries aware of the serious implications this situation may create for international cooperation regarding fishery resources research.

The Committee also recommended that the Secretariat inform the FAO Committee on Fisheries (COFI) of this important matter, bringing to its attention the pertinent section of the report "International Ocean Affairs" prepared by the joint ACMRR/SCOR/WMO(AC) Working Party.

5.2.4 Transplantation of marine fauna and flora and improvement of resources

The Secretary informed the Committee that SCOR had requested ACMRR to consider a proposal submitted to SCOR by Prof. Zenkevitch (U.S.S.R.) for the establishment of a group to be concerned with "the collection of material on all cases

of mass growth of new forms in separate basins, study of the economic effect of acclimatization, development of recommendations on transfer of useful organisms, and recommendations of measures for the counter-action of the transfer of unwanted, harmful components of the flora and fauna to regions new to them." SCOR was interested in some scientific aspects of transplantation, particularly their biological and ecological implications, but, being aware of FAO's interest in this field, particularly in relation to improvement of marine resources including mariculture (see report on item 4.4), considered that it would be more appropriate for ACMRR to review the subject as a whole and to propose action.

In the absence of more detailed information on the proposal, the Committee recommended that FAO should consider the possibility of assigning two consultants (one of whom should be appointed from the U.S.S.R.) to prepare a review of the present situation and related scientific problems and to prepare the ground for a small group of experts to be established in due time under ACMRR and in which SCOR should be invited to participate.

6. MATTERS CONCERNING THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (IOC)

The Secretary and the representatives of IOC introduced the subject and called the Committee's attendion to various matters concerning the Commission. Particular attention was given to the proposed strengthening and broadening of the basis of IOC, and to actions required for the implementation of the Integrated Global Ocean Station System (IGOSS). The results of discussions and conclusions are reported in section 5.1

6.1 Third International Oceanographic Congress

The Secretary referred to ACMRR/4/Rec.7.2, and informed the Committee of the actions undertaken by SCOR and IOC in this matter. The representative of the IOC Secretariat said that this item will be on the Agenda of the Ninth Session of the IOC Bureau and Consultative Council. The Committee considered that although no action in this respect would be required of it at this stage, it would be desirable for alternative ways of organizing such congresses to be considered, for example as a group of inter-connected symposia.

6.2 Coordination Group on the Southern Ocean

The representative of the IOC Secretariat informed the Committee that the IOC Coordination Group on the Southern Ocean had been established (IOC-Res.V-5) to develop plans for the gradual evolution of a comprehensive study of that ocean area, among other things. The Group would include representatives of countries interested in Antarctic oceanography, and interested agencies and international bodies, including the ACMRR, were invited to designate observers.

The Committee recognized that the Southern Ocean was becoming increasingly important from the point of view of fisheries, that there were urgent research problems requiring international cooperation, including investigation of its resources, (particularly krill), and decided to designate Dr. A. Bogdanov to act as ACMRR observer in the Coordination Group.

6.3 Cooperative Investigations of the Caribbean and Adjacent Regions (CICAR)

The Committee was informed of the progress made in the preparations for the Symposium on Investigation of Resources of the Caribbean Sea and Adjacent Regions, to be organized jointly by UNESCO and FAO in Curaçao in November 1968. This Symposium was expected to provide a review of the present knowledge of the area as a basis for the planning and execution of CICAR, scheduled to commence in early 1970.

The Committee noted that contributions from the U.S.S.R. and Japan on fishery resources investigations carried out in the area were missing and requested Dr. A. Bogdanov and Dr. S. Tanaka, with the assistance of the Secretariat, to promote submission of papers by and, if possible, the participation in the Symposium of, fishery scientists from their countries.

6.4 New Suggestions

6.4.1 Proposal for an International Cooperative Study of the Northern Part of the Eastern Central Atlantic (Gibraltar to Dakar)

The Secretary referred to the recent progress made in the investigation of the tropical Atlantic (ICITA, GTS) and to the plans for the Cooperative Investigations of the Caribbean and Adjacent Regions (CICAR). Specific gaps in the knowledge of both the resources and the environment of that area of the Atlantic Ocean here designated as the northern part of the Eastern Central Atlantic had been identified during the ICES Symposium on the Living Resources of the African Atlantic Continental Shelf between the Straits of Gibraltar and Cape Verde, held in Santa Cruz de Tenerife in March 1968, and at the subsequent session of the ACMRR/ICES Working Party on the Fishery Resources of the East Central and Southeast Atlantic. The Symposium had stressed the need for a synoptic study of the oceanographic conditions on the northwest African shelf with particular emphasis on upwelling, combined with plankton investigations. In conjunction with these environmental studies, a programme of fisheries investigations (including a large scale fishery echo survey as elaborated by the joint ACMRR/ICES Working Party) should be carried out. It had therefore been suggested that in case such an international cooperative study materialized it should be organized through IOC, ICES and FCECA.

The Committee considered that better knowledge of the area was greatly needed, and agreed in principle on the desirability of the proposed studies. It felt, however, that many uncertainties still existed regarding the most effective way of organizing such a joint undertaking as well as the priority it should be given in the overall research programme. The Committee therefore requested the Secretariat to give further consideration to the proposals made and to ascertain the reaction of the other interested organizations. It recommended that SCOR be invited to comment on the proposals.

6.5 Other Matters

6.5.1 Cooperative Study of the Southern Mediterranean (CSSM)

The Secretary informed the Committee of progress made in the planning of CSSM. IOC at its Fifth Session had formally accepted this cooperative study. The General Fisheries Council for the Mediterranean (GFCM), at its Ninth Session in Split (December 1967), had agreed to participate in the investigations and to collaborate with IOC and the International Commission for the Scientific Exploration of the Mediterranean Sea (ICSEMS) for its implementation. Further preparations for the cooperative study would be made in consultation between the Secretariats of the sponsoring organizations.

The Committee noted these developments with satisfaction, approved the efforts being made to develop close collaboration between GFCM and ICSEMS, and wished to encourage both bodies to establish joint activities as an important step towards a more efficient research effort in the Mediterranean.

6.5.2 Collaboration between IOC and ACMRR

The President of IOC gave further background information about his letter of 17 May 1968 to the Chairman of ACMRR, on the role of the Advisory Bodies of IOC, particularly in connection with proposals for Cooperative Expeditions, copies of which had been distributed to the Committee members.

IOC intended to publish a Guide for Cooperative Investigations. One of the chapters in this Guide would refer to the role of the Commission's advisory bodies, SCOR and ACMRR, in connection with the evaluation of projects and the elaboration of scientific programmes for cooperative investigations. In this connection, the Commission had raised a number of questions regarding the adequacy of the present arrangements for evaluating and organizing such cooperative investigations.

The Committee requested the Chairman and Vice-Chairmen, in consultation with the Secretariat, to formulate the Committee's replies to these questions.

APPENDIX 1

AGENDA

1. Procedural matters

   1.1 Opening of the Session.

   1.2 Adoption of the Agenda.

   1.3 Date and place of Sixth Session.

   1.4 Election of officers for the forthcoming period of activities.

2. Implementation of recommendations of Fourth Session

3. Organization and scientific basis for the exploitation and development of living marine resources

   3.1 Scientific advice to fishery management and development bodies.

   3.2 International support for fishery resources surveys and related research.

   3.3 Exploration and charting of resources - terms of reference and membership of ACMRR Working Party.

   3.4 Fish eggs and larvae survey - terms of reference and membership of ACMRR Working Party.

   3.5 Fishery resources of Eastern Central and of Southeast Atlantic - report of the ACMRR/ICES Working Party and follow-up of the ICES/FAO Canary Islands Symposium.

   3.6 Fishery resources of Southwest Atlantic - proposed joint ACMRR/CARPAS Working Party.

   3.7 Other matters.

4. Programme of Work of FAO in the field of marine resources during 1970/71 and subsequently

   4.1 General trends.

   4.2 Education and training of fishery scientists.

   4.3 Marine Pollution - terms of reference and membership of the ACMRR Working Party; proposed FAO/IMCO/UNESCO joint group of experts on the scientific aspects of marine pollution; FAO World Conference on Marine Pollution and its Effects on Fishery Resources and Fishing.

   4.4 Improvement of marine resources and mariculture.

   4.5 Follow-up of recommendations of the FAO World Scientific Conference on the Biology and Culture of Shrimps and Prawns, and of the FAO Conference on Fish Behaviour in relation to Fishing Techniques and Tactics.

   4.6 World appraisal of fishery resources - Fishery Section of the Indicative World Plan (IWP), including studies of the implications for management.

5. International Coordination and Cooperation

5.1 Scientific aspects of the implementation of the UN Resolution 2172 (XXI) on Resources of the Sea, and related international action.

5.2 United States proposal for a Decade of Ocean Exploration.

5.3 Matters raised by SCOR, SCIBP and other international bodies.

5.4 Joint action by UNESCO and FAO in the field of marine science and fisheries.

5.5 Other matters.

6. Matters concerning the Intergovernmental Oceanographic Commission (IOC)

6.1 Proposed strengthening and broadening of the basis of the Commission.

6.2 Integrated Global Ocean Station System (IGOSS).

6.3 Third International Oceanographic Congress.

6.4 Coordination Group on the Southern Ocean.

6.5 Cooperative investigations of the Caribbean and Adjacent Regions.

6.6 New suggestions.

6.7 Other matters.

7. Other business

8. Adjournment

APPENDIX 2

LIST OF INFORMATION PAPERS

ACMRR : 5/68/IP.1	International Decade of Ocean Exploration. A Report by the National Council on Marine Resources and Engineering Development, Executive Office of the President, May 1968.
ACMRR : 5/68/IP.2	Work of FAO and Related Organizations Concerning Marine Science and its Applications.
ACMRR : 5/68/IP.3	Aide Memoire on Joint Action by UNESCO and FAO in the Field of Marine Science and Fisheries.
ACMRR : 5/68/IP.4	Summary Report of Activities of FAO Department of Fisheries in Marine Resources Research and Management (1968), by ACMRR Secretariat.
ACMRR : 5/68/IP.5	An Informal and Unofficial Note on the Marine Science Expenditures of FAO and UNESCO, and their Complementary Natures, by S.J. Holt.
ACMRR : 5/68/IP.6	Report of the UN Secretary-General's Group on Marine Science and Technology: Survey and Proposals.
ACMRR : 5/68/IP.7	Aide Memoire on Marine Pollution.
ACMRR : 5/68/IP.8	Preliminary Draft. International Indian Ocean Fishery Development Project.
ACMRR : 5/68/IP.9	Notes on IOC Secretariat Paper for Item 6 of the Agenda of the Fifth Session of the Advisory Committee on Marine Resources Research, by ACMRR Secretariat.

APPENDIX 3

LIST OF WORKING PAPERS

ACMRR : 5/68/WP.1	Draft Provisional Agenda.
ACMRR : 5/68/WP.2	Provisional List of Participants.
ACMRR : 5/68/WP.2 (Suppl. 1)	Provisional List of Participants.
ACMRR : 5/68/WP.3	Provisional List of Working Papers.
ACMRR : 5/68/WP.4	Provisional List of Information Papers.
ACMRR : 5/68/WP.5	Professor Zenkevitch's Proposal for a "Group of Experts on Transplantation and Reconstruction of Marine Fauna and Flora", by ACMRR Secretariat.
ACMRR : 5/68/WP.6	International Cooperation in the Study of Marine Biological Resources. Submitted by Professor V.G. Kort.
ACMRR : 5/68/WP.7	Report of ACMRR Working Party on FAO Regional Fisheries Councils and Commissions. Supplement to the Report of the Fifth Session of ACMRR.
ACMRR : 5/68/WP.8	Summary of Marine Fish Resource Appraisal under IWP (First Draft), by J.A. Gulland.
ACMRR : 5/68/WP.9	Summary Report of the Proceedings of the World Scientific Conference on the Biology and Culture of Shrimps and Prawns, by M.N. Mistakidis.
ACMRR : 5/68/WP.10	Education and Training in Fisheries, by W.F. Royce.
ACMRR : 5/68/WP.11	ACMRR Working Party on Survey and Charting of Fishery Resources, by ACMRR Secretariat.
ACMRR : 5/68/WP.12	UNESCO, IOC, 8th Meeting of the Bureau and Consultative Council, 10-14 June 1968, Recommendations.
ACMRR : 5/68/WP.13	UNESCO, IOC, Working Committee for an Integrated Global Ocean Station System, Draft Summary Report, First Meeting 2-5 April 1968.
ACMRR : 5/68/WP.14	Report of the Third Session of the Committee on Fisheries, 24-30 April 1968.
ACMRR : 5/68/WP.15	Role of Advisory Bodies of IOC, particularly in connection with proposals for cooperative expeditions, by IOC Chairman.
ACMRR : 5/68/WP.16	Tentative Proposal for an International Cooperative Study of the Northern Part of the Eastern Central Atlantic (Gibraltar to Dakar), by ACMRR Secretariat.
ACMRR : 5/68/WP.17	UNESCO, IOC, Fifth Session, Summary Report.
ACMRR : 5/68/WP.18	Report of the Fourth Session of the Advisory Committee on Marine Resources Research.

ACMRR : 5/68/WP.19	UNESCO, IOC, Matters Concerning the Intergovernmental Oceanographic Commission for discussion at the Fifth Session of the Advisory Committee on Marine Resources Research (ACMRR), prepared by the IOC Secretariat.
ACMRR : 5/68/WP.20	Progress Report on the Activities of the Working Party on Direct and Speedier Estimation of Fish Abundance, submitted by B.B. Parrish.
ACMRR : 5/68/WP.21	Scientific Advice to Fishery Management and Development Bodies, by ACMRR Secretariat.
ACMRR : 5/68/WP.22	Draft Report, ACMRR/ICES Working Group on the Fishery Resources of the Eastern-Central and the Southeast Atlantic.
ACMRR : 5/68/WP.23	Follow-up of FAO Conference on Fish Behaviour in Relation to Fishing Techniques and Tactics, by ACMRR Secretariat.
ACMRR : 5/68/WP.24	Working Party on Egg and Larva Survey, by ACMRR Secretariat.
ACMRR : 5/68/WP.25	Draft Report of the Fifth Session of the Advisory Committee on Marine Resources Research.

APPENDIX 4

LIST OF PARTICIPANTS

Members of ACMRR

Dr A.P. Alekseev *	Director, Polar Research Institute of Marine Fisheries and Oceanography Knipovichstr. 6 Murmansk, U.S.S.R.
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Dr A.S. Bogdanov	Director, VNIRO 17 V. Krasnoselskaya Moscow, U.S.S.R.
Dr W.M. Chapman	Director, Marine Resources Ralston Purina Company 739 Golden Park Avenue San Diego, California 92106, U.S.A.
Prof. J.L. Cifuentes-Lemus	Deputy Director Dirección General de Pesca e Industrias Conexas Secretaría de Industria y Comercio Avenida Cuauhtemoc 80 Mexico D.F.
Dr B. Diop	Directeur Adjoint Service de l'Océanographie et de Pêches Maritimes Dakar, Senegal
Prof. M. Fontaine	Membre de l'Institut Laboratoire de Physiologie Generale du Musée National d'Histoire Naturelle 45 rue Cuvier Paris, France
Prof. I. Hela	Institute of Marine Research P.O. Box 14166 Helsinki 14, Finland
Mr A.J. Lee *	Deputy Director Fisheries Laboratory Ministry of Agriculture, Fisheries and Food Lowestoft, Suffolk, U.K.
Dr C.E. Lucas, F.R.S.	Director, Marine Laboratory Department of Agriculture and Fisheries for Scotland P.O. Box 101, Victoria Road Torry, Aberdeen, U.K.

* Unable to attend.

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Dr J.L. McHugh	Deputy Director Bureau of Commercial Fisheries U.S. Fish and Wildlife Service Washington D.C. 20240, U.S.A.
Dr W.E. Ricker	Fisheries Research Board of Canada Biological Station Nanaimo, B.C., Canada
Prof. J.T. Ruud	Institute of Marine Biology University of Oslo Frederiks Gate 3 Oslo, Norway
Dr S. Tanaka	Professor of Population Dynamics Ocean Research Institute Tokyo University Minamidai 1-15-1, Nakano Tokyo, Japan

Members of ACMRR Working Party on FAO Regional Councils and Commissions
(Attending ACMRR Fifth Session)

Dr G.L. Kesteven (Convener)	Fishery Development Officer c/o LARO Apartado Postal M-10778 Mexico 1, D.F.

Representatives and Observers of International Organizations

UNESCO

Mr J.O. Østvedt (Also IOC Secretariat)	Office of Oceanography UNESCO Place de Fontenoy Paris 7e, France

IOC

Rear Admiral W. Langeraar (Chairman of IOC)	Hydrographer Royal Netherlands Navy Badhuisweg 171 The Hague, Netherlands

SCOR

Prof. W.S. Wooster (President of SCOR)	Scripps Institution of Oceanography P.O. Box 109 La Jolla, California 92038, U.S.A.

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Food and Agriculture Organization

Mr R.I. Jackson	Assistant Director-General Department of Fisheries
Mr F.E. Popper	Director of Programme Coordination and Operations Department of Fisheries
Dr S.J. Holt	Director, Fishery Resources and Exploitation Division
Dr M. Ruivo	Chief, Marine Biology and Environment Branch
Mr J.A. Gulland	Chief, Fish Stock Evaluation Branch
Mr S. Olsen	Fishery Biologist, Marine Biology and Environment Branch
Dr D. Sahrhage	Chief, Marine Biology Section, Marine Biology and Environment Branch

Other staff members attended for discussions on certain items.

Officers during the Fifth Period of Activities of the Committee up to and including the Fifth Session

Chairman	Dr C.E. Lucas, F.R.S.
Vice-Chairman and Rapporteur	Dr W.M. Chapman
Vice-Chairman	Dr S. Tanaka

Secretariat of the Committee

Secretary	Dr M. Ruivo
Assisting the Secretary	Mr S. Olsen
Assisting the Secretary	Dr D. Sahrhage
Assistant	Mrs R. Capparucci

MR/78699/9.68/E/1/850